



Liquefied Natural Gas Transfer

The tanks and associated piping shown are parts of a system operated by Distrigas Corporation of Massachusetts in Boston for transferring liquefied natural gas (LNG) from ship to shore and storing it. The installation is typical of a number of similar systems built by Chicago Bridge and Iron Company, Oak Brook, Illinois. In establishing design criteria for these systems, the company benefited substantially from NASA technology.

LNG is a "cryogenic" fluid, meaning that it must be contained and transferred at very low temperatures—about 260 degrees below zero Fahrenheit. This presents a problem: before the LNG can be pumped from the ship to the storage tanks, the two-foot-diameter transfer pipes must be cooled, in order to avoid difficulties associated with sharp differences of temperature between the supercold fluid and the relatively warm pipes. The cooldown is accomplished by sending a small, steady flow of the cryogenic substance through the pipeline; the rate of flow must

be precisely controlled or the transfer line will be subjected to undesirable thermal stresses.

In designing the original system at Boston, Chicago Bridge and Iron searched for relevant information on cryogenic cooldown. The company found that extensive research had been accomplished by Los Alamos Scientific Laboratory under contract to NASA's Lewis Research Center; the work was part of a nuclear rocket engine research program. Four publications resulting from the rocket research constituted the principal body of available knowledge on cooldown of cryogenic transfer lines. These reports proved important in Chicago Bridge and Iron's design of LNG transfer lines for the original and subsequent installations; they also provided a departure point for the company's own extensive development of cooldown technology.

